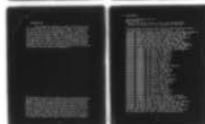


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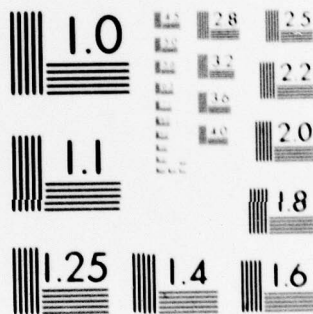
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AMOSIST PROGRAM FIELD EVALUATION  
Executive Summary

MAJ Aaron W. Schopper  
Medical Service Corps, US Army  
Health Care Studies Division  
Academy of Health Sciences, US Army  
Fort Sam Houston, Texas 78234

February 1979

Report No. 5

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The program acceptance by the non-program-related hospital staff was judged to be only moderate. A principal concern of both non-AMOSIST staff and the AMOSISTS' physician supervisors was the AMOSISTS' competence, a concern which was heightened by the withdrawal of the better qualified Clinical Specialist (MOS 91C) from the program. Due to factors associated with the program's manual of algorithms (inefficient) and data recording procedures (logic employed not readily apparent, extent and nature of consultation-related logic overrules not determinable), the manual was not being utilized as required and treatment-related audits were not being performed satisfactorily--a combination which resulted in unacceptably high error rates. Consequently, the program was judged to be medico-legally "at risk." Recommendations were made to modify program materials and effect greater monitorship.

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AARON W. SCHOPPER, Ph.D.  
MAJ, MSC

## 1. BACKGROUND.

1.1 The present AMOSIST program had its beginning in a large scale research effort initially undertaken at Fort Belvoir, VA, in 1967, under the name Project AMOS (Automated Military Outpatient System). The intent was to develop a means of alleviating the shortage of military physicians which was projected to follow the elimination of the draft. The goal of that effort was to have been the development of a system of medical algorithms designed to treat patients suffering acute minor illnesses. As initially envisioned, these algorithms were to have been stored in a computer and accessed by an enlisted Army medical corpsman (an "AMOSIST") via an interactive computer terminal equipped with a video display unit. The physician-supervised corpsman would serve merely as the interface between the computer and the patient, asking the patient the questions which appeared on a video screen and punching in (on the terminal keyboard) the patient's response to each item. The integrity of the algorithm would be safeguarded by the fact that each logic/decision block not be displayed until the response to the previous question had been made. Hence, to the extent that the operator could correctly interpret the patient's response (usually a simple yes/no answer) and enter same into the computer, the medical logic of the algorithm would be preserved and the patient would obtain safe and effective care--to the extent that the algorithm reflected same. However, for a number of factors (not well documented among available Project AMOS reports, but believed to be related to costs and other issues pertaining to the procurement and utilization of computer hardware), Project AMOS was terminated early in 1973 before being implemented as a computer-based system of health care delivery. As a result, the existing algorithms were placed upon paper and incorporated into a manual which was to be employed by AMOSISTs (in conjunction with supervision from a physician) to guide them in their efforts at diagnosing and treating acute minor illnesses. Based upon the favorable results of a brief evaluatory effort conducted by Project AMOS personnel at three sites during the final months of its existence, this hard-copy version of the program was recommended for implementation as a health care delivery system within Health Services Command.

1.2 The present study was initiated in response to a request from the Surgeon General of the Army. The Surgeon General had received requests from the US Navy and the US Air Force for information concerning the operation and effectiveness of the AMOSIST Program. At the time of that request such information was not available.

## 2. OBJECTIVES.

2.1 The objectives of the study were to evaluate the AMOSIST Program as it was being utilized within the US Army Medical Department Activities (USAMEDDAC) to determine:

- a. The operational characteristics of the program.



- b. The extent of program acceptance.
- c. The extent to which a physician savings was being realized.
- d. The cost effectiveness of the program.
- e. The safety and effectiveness of care provided.

### 3. METHODOLOGY.

3.1 The general approach was to collect data relevant to the cited objectives in two phases through a combination of on-site visits and mailed surveys. The operational characteristics of the program were determined from response to a large scale checklist which addressed the functions of an AMIC. Program acceptance was determined through a series of questionnaires administered to both patients and staff (inclusive of both AMIC and non-AMIC hospital staff). The issue of physician savings was addressed by determining the average time required to treat a patient seeking care in an AMIC and comparing same to the average time required to treat a patient seeking care in the traditional counterpart of the AMIC, the General Outpatient Clinic (GOC). The cost effectiveness evaluation was limited to a direct comparison of care-provider cost (salaried cost per patient treated in an AMIC versus salaried cost per patient treated in a GOC).<sup>\*</sup> The safety with which AMOSIST delivered care was provided was addressed principally by determining the extent to which AMOSISTs recorded their findings and treatment on their data collection sheets in accordance with the logic and direction inherent in the algorithms themselves. The effectiveness of the care delivered was evaluated by comparing AMIC-treated patients to GOC-treated patients as regards the relative frequency with which they made non-directed returns to the hospital within 14 days of an initial visit to obtain additional care for the same illness or a related illness.

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<sup>\*</sup>The hourly wage equivalent for each category of care provider was derived from salary-related information provided in the November 1977 Department of the Army (DA) update (DA Message: DACA-FAA-C 0822382N77) to Army Regulation 37-108. Such calculations were based upon a 264 day work year at eight hours per day. (Several levels of physician hourly wage equivalents were computed based upon various combinations of pay grade and special pays and variable incentive pays). The care provider cost associated with the treatment of each patient was then computed by determining the amount of time that each category of care provider spent in treating the patient (to include intra-clinic consultations by physician to non-physician care providers), multiplying each of these amounts of time (converted to fractions of an hour) by the hourly wage equivalents appropriate to each care provider involved, and summing these amounts for all care providers who had participated in the patients care.

3.2 The initial phase of the study occurred during the months of October, November, and December 1976. It involved both a mailed survey to all US Army Medical Activities using the AMOSIST Program, and subsequent on-site visits to twelve facilities randomly selected from those receiving the mailed survey. The mailed survey package included patient satisfaction questionnaires to be completed by patients seeking care in the AMIC, job satisfaction questionnaires to be completed by both AMIC and non-AMIC hospital staff, and a large checklist which addressed the functions of the AMIC. The checklist was to be completed by a non-AMIC staff member. The on-site visits were of three days duration at each site and were begun immediately after the date at which the mailed survey materials were to have been returned. The personnel performing these visits sought not only patient and staff satisfaction information, but also completed the AMIC checklist first hand and individually interviewed the chiefs of clinics and services to which the AMICs commonly referred patients.

3.3 The second phase of the study occurred approximately six months after the initial phase. It, too, involved both mailed survey and on-site visits. The follow-up mailed survey was completed in April 1977. It consisted of the same materials included in the initial survey. The on-site visits during this phase were of two weeks duration at each of three AMICs and three GOCs. The three AMICs involved were among those AMICs (of the 12 visited during Phase I) whose operation was judged to be in greatest accord with existing program guidelines and evidencing the greatest apparent efficiency and effectiveness. The three GOCs selected were those whose operation was judged to be the most traditional; i.e., those relying largely on physician-provided care and employing the least number of non-physician personnel in direct care-provider roles and those having the greatest workload. Data on patient satisfaction were obtained at each site, and timed measurements were obtained for each patient as he progressed through the clinic and received care. The principal temporal measures obtained were the following: (a) the initial patient waiting time, (b) the time required to obtain and record vital signs, (c) the time required for care to be delivered by the patient's primary care provider, (d) the time required for intra-clinic consultations rendered by clinic physicians to non-physician care providers in the clinic (e.g., to AMOSISTs and Nurse Clinicians/Practitioners), (e) the time required for any absences from the clinic due to the need for laboratory tests and/or x-rays, and (f) total time in clinic. The times utilized to compute the care-provider-times used in the cost effectiveness and physician savings evaluations included all time spent by the patient's primary care provider (inclusive of any time spent with the patient subsequent to his return from having laboratory tests or x-rays completed), all time spent (if required) by the primary care provider in waiting for and obtaining intra-clinic consultations from a physician, and (if performed) the time spent by the physician providing the requested consultation. The care-provider costs associated with the treatment of each patient were determined by multiplying each of the aforementioned times (converted to fractions of an hour) by the hourly cost equivalent of the salary appropriate to each category of care provider involved and summing them.



#### 4. FINDINGS.

##### 4.1 Operational characteristics.

4.1.1 General. The AMOSIST program operational guidelines are in two documents, AR 40-48, Health Care Extenders, 9 June 1975, and Ambulatory Patient Care Model #13, Annex B, AMOSIST Program Implementation Packet for Screening and Acute Minor Illness Clinic, US Army Health Services Command, (HSC APC Model #13), August 1976. The Army Regulation specifies the requirements to initiate an AMOSIST program. The HSC APC Model #13 provides a substantial set of guidelines for the operation of the program. These guidelines are for a closely supervised program demanding strict adherence to the algorithms.

4.1.2 An opinion was obtained from The Judge Advocate General in 1973 regarding the AMOSIST program. It was emphasized that the AMOSIST must be closely monitored, the history forms must be completed, the algorithms meticulously followed, and that patients must be informed that the AMOSIST is not a physician.

4.1.3 Most MEDDACs had documented the requirements for establishing the program as required in AR 40-48 (e.g., credentialing papers, and a Therapeutics Agent Board reviewed and Commander approved drug list). Most sites had a suitable physical facility and work environment.

4.1.4 A significant number of sites were deficient in one or more of the operational aspects discussed below. Most of these are addressed by HSC APC Model #13.

4.1.4.1 A substantial portion of the sites have eliminated or modified the triage portion of the program. This is an essential portion of the program intended to select those patients who can be treated by the program's algorithms.

4.1.4.2 Few, if any, sites have an adequate audit program. This is a major defect of the operating programs and also a shortcoming of the controlling guidelines. A valid, rigorous, and timely audit program that is within the resources and time constraints of the treatment facility needs to be developed.

4.1.4.3 AMOSISTs are not always constrained to follow the algorithms' logic in the diagnosis and treatment of the patient. Indeed, they are not always limited to treating only those diseases or symptoms complexes covered by the AMOSIST Manual.

4.1.4.4 Both the guidelines furnished and the practices employed to inform the patient of the non-physician status of the AMOSIST are of questionable effectiveness.

4.1.4.5 There is evidence of lack of mutual understanding between AMIC and other clinics regarding their respective operational policies and limitations. The referral and acceptance of patients is hampered by this lack of understanding.

4.1.4.6 The supervising physician must know the entire AMOSIST system if he is to be effective. Some sites do not have a permanently assigned physician and depend on a roster assigned supervisor, while others have an individual assigned the responsibility but still have a significant amount of the physician staffing on a rotating basis. This was found to be extremely deleterious to AMIC operations.

#### 4.2. Program acceptance.

4.2.1 Patient acceptance. The findings showed that patients were well satisfied with the manner in which care was delivered by the AMIC care providers. In general, it was the older patient, the retired patient, the officer or his dependent patient who reported the greatest satisfaction. Comparison of patient satisfaction of those treated by an AMOSIST with those treated by a physician in a General Outpatient Clinic (GOC) showed a statistically significant greater satisfaction with the AMOSIST. This greater satisfaction was consistent in such patient rated specifics as thoroughness of examination, amount of information provided to patient, amount of interest shown in patient as an individual, amount of time spent with the patient, and in courtesy and friendliness.

#### 4.2.2 AMOSIST.

4.2.2.1 Job satisfaction. There was an acceptable level of job satisfaction expressed by the AMOSIST. It was of the same level, overall, as his counterpart working elsewhere in the hospital. Those with a basic MOS of 91C expressed greater satisfaction than the 91B AMOSIST and the non-AMOSIST 91C.

4.2.2.2 Program evaluation. Again the 91C, and also the recently trained 91B AMOSIST, was more secure and had a higher opinion of the program. The most striking variable of the AMOSISTs' evaluation of the program was his perception of the supervisory physician's level of knowledge of the program. Roster assigned physicians were not perceived to have the knowledge to operate well within the program.

4.2.3 AMOSIST Physicians. The overall job satisfaction of AMOSIST physicians was considered to be satisfactory. They expressed a significantly higher level of satisfaction than other military physicians serving in outpatient clinics in the same hospital.

4.2.4 Non-AMIC Hospital Staff. The acceptance of the AMOSIST program by other hospital staff (physicians, nurses, enlisted personnel)



was considered to be moderate. There was marked variation in acceptance with physicians ratings the highest and nurses the lowest. Within any group, the perception of need for the program and of the adequacy of care were highest in those with the most knowledge of the program.

4.2.5 Difference in Program Acceptance Between Phase I and II. In the six months between the data collection in Phase I and II there was a decrease in the reported job satisfaction of the AMOSIST and a lowering of the AMOSIST physicians' evaluation of the AMOSISTs they supervised. The significant program change during this interval had been the removal of the 91C MOS from the AMOSIST positions. Thus the group that had been the most satisfied with their job was removed. The average 91C had more hospital training (vocational nurse), was usually older and more mature, and had more service than the average 91B AMOSIST; so it is not unexpected that the supervising physician would consider them more competent. The patients who were seen by the AMOSIST during this later evaluation period did not agree, they reported a slightly higher level of satisfaction than before.

#### 4.3 Physician Savings.

4.3.1 The actual time that a patient spent with a physician at the primary clinic was measured in the AMIC and in the General Outpatient Clinic (GOC). It was significantly less in the AMIC (2 minutes versus 6.5 minutes).

4.3.2 This would be a specious finding indeed if the AMIC patients were referred to other or secondary clinics in significant numbers while the GOC physicians disposed of their patients without further consultation. To account for this, the total time a patient spent with any physician in the primary clinic or by referral to a secondary clinic was calculated. Again, the AMOSIST treated patients were found to use less physician time than those treated at a GOC (five and one-half minutes versus nine minutes).

4.4 Cost effectiveness. The cost-per-patient treated was computed based on care-provider related costs. Consideration was given to this care cost-per-patient to include referral to secondary clinics. Several levels of physician costs per hour were calculated, derived from various combinations of rank and physician special pay provisions. At all but the lowest (and unrealistic) levels of physician cost, the average care-provider related cost for the patient receiving AMOSIST delivered care, was significantly lower than the average for the patient receiving GOC physician care.

4.5 Effectiveness of AMOSIST care. As measured by the non-directed return of patients seeking care for the same or related condition, there was no significant difference between AMIC and GOC treated patients.

#### 4.6 Safety of AMOSIST care.



4.6.1 The evaluation of safety is measured by the adherence to the algorithm by the AMOSIST. This is the basis of the program. It is only safe to have an essentially untrained person diagnosing and prescribing to patients if he follows directions exactly. The directions in this program are to triage the patients so the AMOSIST treats only those whose complaint is addressed by an algorithm and that he then rigidly follows the stepwise logic of the algorithm.

4.6.2 The absence of the triage step at some sites has already been mentioned. This omission removed the safety check that the AMOSIST will treat only patients covered by the algorithm.

4.6.3 Data Collection Sheets (the sheets upon which AMOSISTS record their findings and treatment) were reviewed to see if the necessary entries were made, that the algorithms required, to arrive at the diagnosis recorded. Only single complaint records were used so the logic trail would be clear.\* Any record where the AMOSIST asked for a consultation with the physician during the logic progression were also excluded since any deviation may have been authorized by the medical officer.

4.6.4 Among these single diagnosis Data Collection Sheets, less than 3% were completed in accordance with the algorithm. This compares with a 50% error-free rate for PA level care providers using algorithms (as reported in the medical literature) and a 70-80% error free rate for the BAMC AMIC (a closely audited program). The error rate reflected in the present findings represent, therefore, an unsatisfactory level of compliance.

4.6.5 Safety of a program is enhanced by audit and correction action based on the audit. At no MEDDAC visited was their routine audit a tedious and time consuming exercise.

4.6.6 The non-conformity to acceptable standards of safe operation of this program has resulted, in part, from inadequate regulatory documentation. The program guidance in Army Regulations (AR 40-2 and 40-48) are followed when they are specific (prescription practices), but are of little value when they are general. For example, AR 40-48 indicates "... limits of functions for AMOSISTS are delineated in logic flow charts which are physician prepared." Specifics of details of the program that would result in a safe program are in HSC APC Model #13, a publication that is not directive but advisory in nature. Audit methodology and standards, audit feedback, source and validation of algorithms, and forms to be used should be published in a directive.

## 5. CONCLUSION.

The present operating AMOSIST program has been shown in this study to be fulfilling its intent in offering medical care for acute minor illness. It is cost-effective in comparison to physician care in a general outpatient clinic; it saves physician time; it is well accepted by patients; hospital community acceptance varies from well to tolerance in direct relationship to the evaluator's factual knowledge of the program

\*It is noted that the single diagnosis constraint represents the "simplest case" condition.

operation. This study shows it to provide as effective treatment as that of physicians in general outpatient clinics. Safety for the patient depends on triage to assure that there is an algorithm for his complaint and then on the algorithm being followed exactly to arrive at a diagnosis and treatment. The study determined that neither of these safety criteria are present. When an AMOSIST treats a patient with no algorithm or if he deviates from the algorithm logic, he is using medical judgement, a process he is not trained for. The safety of the program for the AMEDD depends upon compliance to The Judge Advocate General's opinion on acceptable standards for legal protection. The principal requirements were that the AMOSIST's non-physician status be made clear to the patient, the algorithms be followed exactly, and that there be close monitorship to assure adherence to the algorithm (audit). These are not adequately controlled for the AMEDD to be safe from criticism or sanctions if injury were to occur.\*

#### 6. RECOMMENDATION.

The recommendations of the previous reports are appended; review of the study data indicates no changes in those recommendations.

#### 7. REFERENCES.

Schopper, A. W., AMOSIST Program Field Evaluation, Phase I: Operational Characteristics and Program Acceptance, Health Care Studies Division Report: HCSD 78-002-A, March 1978(a).

Schopper, A. W., AMOSIST Program Field Evaluation: Physician Savings and Cost Effectiveness, Health Care Studies Division Report: HCSD 78-002-B, August 1978(b).

Schopper, A. W., AMOSIST Program Field Evaluation: Safety and Effectiveness of Care, Health Care Studies Division Report: HCSD 78-002-C, February 1979.

Schopper, A. W., and Scott, I.L., AMOSIST Program Field Evaluation: Stability and Viability--A Reevaluation of Program Acceptance and Operational Characteristics, Health Care Studies Division Report: HCSD 78-002-D, March 1979.

\*The records of the Department of Legal Medicine, Armed Forces Institute of Pathology, show that since the start of the AMOSIST program until 1 January 1979, that of the 109 individuals involved in allegations of malpractice (92 cases) in CONUS Army medical treatment facilities, only one AMOSIST was mentioned.

## APPENDIX A

### AMOSIST PROGRAM FIELD EVALUATION PHASE I: OPERATIONAL CHARACTERISTICS AND PROGRAM ACCEPTANCE



## 5. CONCLUSIONS.

5.1 Operational Characteristics. As regards the operational characteristics of the AMOSIST program, it is concluded that:

5.1.1 The documents required to initially implement an AMOSIST Program are in existence at most sites.

5.1.2 The physical setting and work environment is suitable at most sites.

5.1.3 An appreciation of the scope and limitations of the care provided in AMOSIST-staffed clinics is not present to an adequate degree in most non-AMOSIST clinics/services.

5.1.4 The triage function has not been appropriately implemented at a substantial portion of sites.

5.1.5 Patient disposition practices employed in AMICs, and the reactions to same for non-AMIC clinics, reflect a lack of mutual understanding on the part of both AMICs and non-AMIC clinics regarding their respective operational policies and limitations.

5.1.6 Formally implemented, adequate, regularly performed, well documented auditing programs are largely absent.

5.1.6.1 Descriptions and guidelines for efficiently performing audits are not adequately provided in existing system-defining documents and materials.

5.1.6.2 The guidelines and procedures employed to inform patient of the non-physician status of AMOSIST are of questionable merit and effectiveness.

5.1.7 AMOSISTs are not closely constrained to the scope and manner of medical practice delineated in the algorithms contained in the AMOSIST Manual.

5.1.8 From the vantage point of the legal opinion rendered by the Judge Advocate General's Office, the AMOSIST program is operating in a manner which leaves it vulnerable to a successful suit by alleged medical malpractice resulting from AMOSIST-delivered medical care.

5.2 Program Acceptance. As regards the issue of program acceptance, it is concluded that:

5.2.1 An acceptable level of patient satisfaction exists.

5.2.2 An acceptable level of job satisfaction exists among AMOSISTs and AMOSIST physicians; i.e., the overall job satisfaction for both non-trainee AMOSISTs and AMOSIST physicians equal that of their counterparts who serve in non-AMIC outpatient facilities.

5.2.2.1 AMOSIST trainees or those AMOSISTs who have recently completed their OJT phases of training are more satisfied with their work than are their more senior co-workers.

5.2.2.2 AMOSISTs having a 91C MOS are more satisfied with their work than are AMOSISTs with a 91B MOS.

5.2.2.3 Non-trainee AMOSISTs working at sites wherein roster-assigned physicians supply a substantial portion of the physician man-hours provided to the AMIC report less satisfaction with their work than do their counterparts who work at AMICs which are staffed primarily with physicians who are regularly assigned to the clinic.

5.2.3 Acceptance of the AMOSIST Program is judged to be moderate by medically trained personnel who work in other clinics/services which provide outpatient medical care; those who report a greater knowledge of the AMOSIST Program (1) indicate that a greater need exists for such a clinic and (2) perceive the competence of the AMOSIST to be higher.

6. RECOMMENDATIONS: It is recommended that:

6.1 More complete and definitive, legally binding program document(s) be written (i.e., either an HSC Supplement to AR 40-48, a substantial revision and enlargement of AR 40-48, or a new Army Regulation) and that the provisions of the recommended document be consistent with the positions taken in the legal opinion which has been rendered by the Office of The Judge Advocate General.

6.2 Directives pertaining to the development and approval of local changes or additions to the AMOSIST Manual be more complete and include a requirement for HSC review and approval.

6.3 Auditing requirements be standardized as to type, frequency, and documentation and that such requirements be accompanied by fully explicated, efficient programs of application.

6.4 Command directives emphasize to local commanders the necessity to involve Chiefs of specialty clinics in the development and/or modification of a local AMOSIST Program guidelines pertaining to the referral of patients from the AMIC and the AMIC Triage desk.

6.5 Facilities be required to use a regularly assigned physician(s) to provide at least four hours per day in the AMIC fulfilling the role of an AMOSIST physician.

6.6 Guidelines pertaining to patient informedness be revised to eliminate the need for AMOSIST themselves to inform the patient of this own non-physician status, and that favorable consideration be given to the replacement of the term AMOSIST (as applied to the enlisted care-providers in the AMIC) with one which more immediately and obviously identifies him as a non-physician.



## APPENDIX B

### AMOSIST PROGRAM FIELD EVALUATION: PHYSICIAN SAVINGS AND COST EFFECTIVENESS

## 5. CONCLUSION.

As regards the clinics included in the present study, it is concluded that:

5.1 AMIC and AMOSIST delivered care requires less physician time than does GOC and GOC physician delivered care.

5.2 AMIC and AMOSIST delivered care is less costly than GOC and GOC physician delivered care at the levels of physician care/ consultation costs which are likely to exist within most clinics.

## 6. RECOMMENDATIONS.

No recommendations are made as a result of the present findings. Concern has been previously expressed (Schopper, 1978) regarding other facets of the AMOSIST Program not herein addressed, and the data have not yet been analyzed regarding the more important issues of "safety and effectiveness of care." Final recommendations will appear in an executive summary to follow.

# APPENDIX C

## AMOSIST PROGRAM FIELD EVALUATION: SAFETY AND EFFECTIVENESS OF CARE



## 5. SUMMARY OF FINDINGS

### 5.1 Findings Related to Safety of Care Delivered

5.1.1 Presence of Vital Signs on DCS. The vital signs were found to be relatively infrequently recorded. Among the sample of 282 single diagnosis DCSs completed solely by AMOSISTs, only 60.9 percent has the temperature recorded, none evidenced a pulse rate, 0.7 percent depicted the respiratory rate, and 12.6 percent showed the patient's blood pressure.

5.1.2 Treatment DCS Error Rates. Two hundred eighty two DCSs AMOSIST completed DCSs showing one diagnosis and no evidence of a physician consultation were examined to determine to what extent the data recorded therein was in accord with the logic and direction provided in the algorithms. For the purpose of the study, two independent types of errors were identified which correspond to differences reflected on the data entry points of the DCSs themselves. Type A errors were those denoting the presence of a positive (+) entry in data entry points which had been specially marked on the DCS (with an asterisk) to inform the AMOSIST that if the symptoms corresponding to same existed, he must seek a physician consultation prior to completing a treatment plan for a patient. Type B errors were those which denoted the presence of entries to the remaining (non-asterisked) data entry points which were contrary to the logic of the algorithm. These logic-related errors should also have resulted in a consultation with a physician since an AMOSIST is not permitted to assume the entire responsibility for the care of the patient unless that care is in total accord with the algorithm. Both types of errors, therefore, reflect errors of omission since both should have resulted in a consultation with a physician--an action which did not occur in the sample of the DCSs evaluated. Independently considered, the results of the analysis for Type A errors indicated that a physician's consultation was not rendered as required for 73 percent of the 282 cases evaluated. A separate analysis addressing only Type B errors showed that an even greater proportion, 90.1 percent, of the DCS should have reflected a physician's involvement because of some discrepancy between the algorithm's logic and the AMOSIST's recordings regarding either the symptoms indicated or the treatment plan developed. Considered jointly, the findings were that nearly all of these 282 DCSs, 97.1 percent, evidenced an error of omission--a lack of a consultation with a physician.

5.2 Findings Related to Medical Effectiveness of Care Delivered (Patient Return Rates). Among the eight general categories of illness addressed by the AMOSIST algorithms, the overall proportion of AMIC-treated patients who made non-directed returns to obtain additional care for the same or a related illness as had been treated than that evidenced among GOC-treated patients.

### 5.3 Additional Findings.

5.3.1 Overall, among all 905 DCSs of AMIC-treated patients included in the retrospective record audit, the data were entered upon current DCSs for 83.6 percent of the patients, upon outdated DCSs for 3.2 percent of the patients, and upon SF 600s for the remaining 13.2 percent of the patients.

5.3.2 Frequency of Occurrence Among Diagnosis Rendered. Among all 905 DCSs included in the retrospective audit, nearly 40 percent (20 diagnosis) of the 52 specified diagnoses included in the present AMOSIST Manual occurred two times or less; nine of these did not occur at all.

5.3.3 DCS Format. The format of the DCSs presently in use in the AMOSIST Program does not provide a clear and readily understandable record of the logic employed by AMOSIST in arriving at a diagnosis and determining a treatment plan. Nor do the data recording procedures employed enable AMOSIST physicians performing requested consultations to document the extent and nature of their involvement in the treatment of an AMOSIST's patient.

## 6. CONCLUSIONS.

### 6.1 Safety of Care.

6.1.1 As a result of the exceptionally high error rate, the AMOSIST program is viewed to be "at risk" from a medico-legal perspective.

6.1.2 The present AMOSIST Manual is overburdened with instructions and logic pertaining to infrequently utilized diagnoses; a condition which is believed to be contributing to the lack of its use by AMOSISTS in the field and, consequently, to the high error rate evidenced.

6.1.3 The validity and efficiency of existing and envisioned treatment DCS auditing procedures is degraded by the lack of current program-prescribed treatment DCSs to record the findings, treatment and disposition of all AMOSIST-treated patients.

6.1.4 The format of the current data collection sheets and the procedures used by the physicians to record the extent and nature of their impact upon the treatment of an AMOSIST's patient are incompatible with a requirement to efficiently and effectively perform manual audits of treatment DCSs.

6.2 Effectiveness of Care. The AMOSIST Program has the potential to deliver care which is not significantly different in its effectiveness than that which would be delivered by physicians treating a comparable sample of patients.

## 7. RECOMMENDATIONS.

7.1 Principal Recommendations. The principal recommendations arising from the present report are that:

a. A new series of DCSs and data collection procedures be developed that will clearly depict (1) the logic utilized by the AMOSIST in examining and treating their patients, and (2) the nature and extent of physician impact upon the algorithmic care delivery process which results from AMOSIST-requested physician consultations.



b. HSC develop binding, enforceable guidance for users of the AMOSIST Program that requires daily formal audits to be locally performed and documented and that the results of same (as applies to each AMOSIST) be communicated to each AMOSIST on a daily basis.

c. HSC institute a command quality control program consisting of two basic elements.

(1) The MEDDAC report results of their AMOSIST audit program on a routine basis.

(2) A requirement that each program receive an on site audit of randomly selected records by HSC headquarters personnel as part of routine staff visits and/or the IG visit. This should be done as frequently as practical but as a minimum annually.

7.2 Additional Recommendations. The following actions are recommended for implementation at the appropriate time as determined by the DCSPA, HSC, as part of the AMOSIST Program improvement:

a. That, to the extent possible, the logic employed in each such DCS series be that derived from or to be added in the research efforts ongoing at the BAMC AMIC.

b. That the algorithms and DCSs first revised be those already validated by the BAMC University of Washington (BAMC/UW) Study.

c. That a hierarchy of priorities be developed for the remainder of the algorithms to be addressed, and that this hierarchy be consistent to the extent possible with the sequence in which BAMC/UW intends to address similar algorithms.

d. That any revision of the AMOSIST Manual and associated DCSs reflect the results of an evaluation undertaken to determine the incidence of the diagnoses included in order to increase:

(1) the efficiency and utility of the program, and

(2) the likelihood that the products of the revision are, in fact, employed by the intended users.

#### APPENDIX D

##### AMOSIST PROGRAM FIELD EVALUATION: STABILITY AND VIABILITY--A RE-EVALUATION OF PROGRAM ACCEPTANCE AND OPERATIONAL CHARACTERISTICS



## 5. SUMMARY OF FINDINGS.

5.1 AMIC Checklist. The operations of the AMICs evaluated evidenced considerable change between Phases I and II although there existed no statistically significant change in either a positive or negative direction. The area evidencing the most positive change was that pertaining to the triage function. The most negative changes were evidenced in the areas of AMOSIST supervision and auditing functions. (The latter is believed to be due largely to the use of terminology which unambiguously defined "audit" to mean a "formal," recorded audit.) Aside from the extent of change, per se, the findings continued to evidence low levels of functioning in the critical areas of AMOSIST supervision, auditing procedures, and physician staffing practices.

5.2 Patient Satisfaction. Among the sites included in the mailed surveys, there was a statistically significant increase between Phase I and Phase II findings regarding the level of patient satisfaction evidenced. The comparison between patient satisfaction present at the three AMICs and the three General Outpatient Clinics (GOCs) included in the Phase II evaluation of Cost Effectiveness and Physician Savings (Schopper, 1978b) showed patients treated at AMICs were significantly more satisfied with the treatment received than those treated at GOCs.

### 5.3 Staff Satisfaction

5.3.1 AMOSISTs. The interphase comparisons showed AMOSISTs in Phase II to be significantly less satisfied with their work than were AMOSISTs in Phase I. Additionally, there were significantly more 91Bs and significantly fewer 91Cs in Phase II than were in Phase I. Since the 91B in Phase II was also significantly less satisfied with his job than his 91C counterpart (a finding consistent with Phase I results), the interphase decrement was hypothesized to be due to the prevalence of the 91B in the Phase II sample. In contrast to the Phase I finding of greater job satisfaction among AMOSISTs than among non-AMOSISTs, the job satisfaction of Phase II AMOSISTs was found to be significantly different from their non-AMOSIST counterparts. As in Phase I, however, AMOSISTs in training status at the time of the Phase II evaluation were found to be more satisfied than their more experienced co-workers. A similar interphase consistency was found regarding the RAP versus non-RAP evaluation. AMOSISTs serving at AMICs wherein roster-assigned-physicians provided a significant portion of the physician man-hours supplied to the clinic were significantly less satisfied with their work than those serving at AMICs staffed by regularly assigned physicians.

5.3.2 AMOSIST Physicians. AMOSIST Physicians responding in Phase II were significantly less satisfied with their work than were those who responded in Phase I. They were not, however, significantly different from Phase II physicians serving in other outpatient clinics. Their evaluations of AMOSISTs and the AMOSIST Program evidenced a significant decrease between Phases I and II. Issues pertaining to the AMOSISTs competence were prominent, and it is believed that the decrements shown were due, in large measure, to the substantially increased proportion of the less formally educated 91B (vis-a-vis the 91C) working in the AMOSIST Program at the time of the Phase II evaluation.



5.3.3 Non-AMIC Staff Perceptions. Statistically significant inter-phase changes were observed in the comments rendered regarding the Program. In consonance with the perceptions of the AMOSIST MD cited above, these changes evidenced a lack of confidence in the competence of AMOSIST and, too, are believed to reflect the increase in the relative percentage of 91Bs (versus 91Cs) in the AMOSIST Program at the time of the second phase evaluation.

## 6. CONCLUSIONS.

### 6.1 Operational Characteristics.

6.1.1 There occurred no overall statistically significant directional change in the operational characteristics of the AMOSIST Program between Phase I and Phase II.

6.2.1 The program continues to remain acutely deficient as regards the performance of adequate, documented audits of the AMOSIST's performance-- a function which is believed (in view of the small amount of formal medical education provided by the AMOSISTs) to be a critical, core requirement of the program.

6.1.3 Inadequate physician staffing and supervision practices continue to exist. Checklist data indicate that physicians who are not regularly assigned to the AMIC continue to provide a substantial portion of the physician man-hours provided to some clinics (a practice which, according to AMOSISTs responses on the job satisfaction questionnaire, is deleterious to their morale and their stated likelihood of remaining in the Army). Data from both the AMIC Checklist and from the AMOSISTs' responses to the questionnaire addressing their work satisfaction indicate that physician supervision is not available to AMOSISTs at some sites during the entirety of their working hours.

6.1.4 Overall, the operational characteristics of the program are such that it is considered to remain "at risk" from a medico-legal perspective.

### 6.2 Program Acceptance.

6.2.1 Patient Satisfaction. The manner in which medical care is delivered by AMOSIST Program care providers is acceptable to the recipient of such care.

6.2.2 Staff Satisfaction. As the apparent result of the replacement of the better-educated 91C AMOSIST with the lesser-educated 91B AMOSIST (a) the job satisfaction of both AMOSIST physicians and AMOSIST themselves decreased between Phases I and II, and (b) the rating given by both the AMOSIST physicians and the hospital staff in general regarding the perceived competence of AMOSISTs decreased during the interim between Phase I and Phase II.

#### RECOMMENDATION.

The findings and conclusions rendered in the present report are in consonance with, and reinforce the findings and conclusions of the initial report of this study (Schopper, 1978a). As a result of the present replication, the recommendations of that report remain relevant and receive added emphasis. The exception pertains to the issue of physician staffing. Rather than recommending at least a one-half time regularly assigned physician to each AMIC as was initially advocated (para 6.5, Schopper, 1978a) it is now recommended that (a) each AMOSIST-staffed clinic have a minimum of one regularly assigned physician present in the clinic during the entirety of its hours of operation, and (b) the roster assignment of physicians not be permitted as principal physician supervisor to AMOSISTs.\*

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\*No recommendation is made for remedial action concerning the decrement observed between Phases I and II regarding the perceived competence of AMOSISTs. The perceived degradation-of-competence was cited by both AMOSIST Physicians and non-AMIC hospital staff. This is concomitant with the withdrawal of 91C from the program and appears to be an expression of anticipation rather than of actual observation. The other observer group, the patients, did not share their loss of faith but actually expressed a slight increase in patient satisfaction. It is also the opinion of the study workers that implementation of a better controlled and operated program will do more to increase confidence in the program than changing the admission requirements for the AMOSIST.



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